

Claims:

1. A method of production of carbon nanoparticles,  
comprising the steps of:  
5 providing on substrate particles a transition metal  
compound which is decomposable to yield the transition  
metal under conditions permitting carbon nanoparticle  
formation;  
contacting a gaseous carbon source with the substrate  
10 particles;  
before, during or after said contacting step,  
decomposing the transition metal compound to yield the  
transition metal on the substrate particles;  
forming carbon nanoparticles by decomposition of the  
15 carbon source catalysed by the transition metal;  
and  
collecting the carbon nanoparticles formed.
2. A method as claimed in Claim 1, wherein the transition  
20 metal compound is a transition metal salt.
3. A method as claimed in Claim 2, wherein the transition  
metal salt is a transition metal formate or oxalate.
- 25 4. A method as claimed in Claim 1 or Claim 2, wherein the  
transition metal compound is a transition metal  
carbonyl.

5. A method as claimed in Claim 4, wherein the transition metal compound is a multi metal atom transition metal carbonyl.
- 5 6. A method as claimed in any one of the preceding claims, wherein the transition metal is nickel, iron or cobalt.
7. A method as claimed in any one of the preceding claims, 10 wherein the gaseous carbon source is a hydrocarbon or carbon monoxide.
8. A method as claimed in Claim 7, wherein the gaseous carbon source is methane or acetylene.
- 15 9. A method as claimed in any one of the preceding claims, wherein the gaseous carbon source is passed over the substrate particles.
10. A method as claimed in any one of the preceding claims, 20 wherein the gaseous carbon source is mixed with a diluent.
11. A method as claimed in Claim 10, wherein the diluent is argon.
- 25 12. A method as claimed in any one of the preceding claims, wherein the substrate particles comprise oxide particles and/or silicate particles.

13. A method as claimed in Claim 12, wherein the substrate particles comprise one or more of silica, alumina,  $\text{CaSiO}_x$ , calcium oxide or magnesium oxide.

5 14. A method as claimed in any one of the preceding claims, wherein the substrate particles are in the form of a fumed powder, a colloid, a gel or an aerogel.

10 15. A method as claimed in any one of the preceding claims, wherein the transition metal compound is decomposed by heating.

15 16. A method as claimed in Claim 15, wherein the transition metal compound is decomposed by heating to a temperature between 200 °C and 1000 °C.

17. A method as claimed in Claim 16, wherein the transition metal compound is decomposed by heating to a temperature between 600 °C and 1000 °C.

20 18. A method as claimed in any one of the preceding claims, wherein the carbon nanoparticles are carbon nanotubes.

25 19. A method as claimed in any one of the preceding claims, wherein the carbon nanotubes are single walled carbon nanotubes.

30 20. A method as claimed in any one of the preceding claims, further comprising the initial step of impregnating the substrate particles with the transition metal compound.

21. A method as claimed in any one of the preceding claims,  
where the method is continuous.

5    22. A method as claimed in Claim 21, comprising the steps of:  
continuously providing substrate particles;  
fluidising the substrate particles with a flow of gaseous  
carbon source;  
heating the transition metal compound on the substrate  
10    particles; and  
collecting the carbon nanoparticles formed by elution.

15    23. A method as claimed in Claim 21, comprising the steps of:  
continuously providing substrate particles to an upper  
part of an inclined surface;  
contacting the substrate particles on the inclined  
surface with a flow of gaseous carbon source;  
heating the transition metal compound on the substrate  
particles; and  
20    collecting carbon nanoparticles formed from a lower part  
of the inclined surface.

25    24. A method of production of carbon nanoparticles,  
comprising the steps of:  
providing on substrate particles a transition metal  
oxalate, formate or multi metal atom carbonyl;  
heating the transition metal oxalate, formate or multi  
metal atom carbonyl on the substrate particles;  
contacting a gaseous carbon source with the substrate

particles; and collecting the carbon nanoparticles formed.

25. A method as claimed in Claim 24, wherein the transition metal oxalate, formate or multi metal atom carbonyl is nickel formate and the substrate particles are silica particles.
- 10 26. Carbon nanoparticles formed by a method as claimed in any one of the preceding claims.